

POPULAR Computing WEEKLY

14 October 1982 Vol 1 No 26

35p

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the Colour Genie**

**Vic joystick
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**Spectrum Rom
secrets revealed**

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on Spectrum

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On November 1st a new Product Information Service will become available to you. You will probably see it advertised in this and other computer magazines. It will allow you to enquire about any kind of product or service within the home computer field, and receive a personal answer detailing just what is available, where from, how much, and so on, plus other useful and related information and some special offers. We will tell you more about how it operates next month. But part of the service will involve the maintenance of a Secondhand Computer Register, listing used computers and peripherals for sale privately. Appropriate information from this Register will be sent out from November 1st onwards to all interested enquirers from both this and other magazines. This Register is being compiled now, so if you have an item or items you would like to sell, perhaps before Christmas, please send us the fullest possible details right away. There are no restrictions on the number of goods offered or words used, so please make sure that you put down everything that is relevant. There is a straightforward charge of £4 for registration, reduced to £3 if the total asking price is under £100. Remember, enquiries will come from a number of sources and a very large total readership, and registration will be maintained until your goods are sold. So let us know what you have to offer. All registrations will be immediately acknowledged and details verified with you. Please make cheques or postal orders payable to:

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Hobhouse Court, 19 Whitcomb Street,
London WC2
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Published by Sunshine Publications Ltd.

Typesetting, origination and printing by
Chesham Press, Chesham, Bucks

Distributed by S M Distribution
London SW8. 01-274 8611. Telex: 261643

© Sunshine Publications Ltd 1982

Subscriptions

You can have Popular Computing Weekly sent to your home: the subscription rate is £19.95 per year, for addresses in the UK, £37.40 overseas.

How to submit articles

Articles which are submitted for publication should not be more than 1000 words long.

All submissions should be typed and a double space should be left between each line.

Programs should, whenever possible, be computer printed.

At present we cannot guarantee to return every submitted article, so please keep a copy.

Accuracy

Popular Computing Weekly cannot accept any responsibility for any errors in programs we publish, although we will always by our best to make sure programs work.

This Week



Cover illustration by Ian Craig

News	5
Texas offers £50 refund.	
Letters	7
I'm nothing but a hound dog.	
Asteroids	8
A new game for Spectrum by Antony Ascroft.	
Street Life	10
David Kelly talks to Nigel Searle of Sinclair.	
Machine Code	11
Memory and the micro.	
Reviews	12
We look inside the Colour Genie.	
Open Forum	16
Five and a half pages of your programs.	
Better than Basic	21
Win a Jupiter Ace.	
Spectrum	22
Rom secrets revealed.	
Programming	23
Vic joystick control.	
Peek & poke	25
Your questions answered.	
Competitions	26
Puzzle, Arthur.	

Editorial

Microcomputers have many applications, both serious and not-so-serious. However, most people buy microcomputers primarily to play games on them.

There is nothing wrong with playing games. They can be stimulating, relaxing, even useful. Above all they are fun.

But, microcomputers are essentially tools. They are aids to reasoning that can be put to whatever use we decide.

As yet, however, despite a few fanciful schemes about running nuclear power stations from ZX81s, microcomputers have not really been assimilated into our society. This is because we are uncertain how microcomputers should be used in industry, commerce and the home.

Increasingly, the limits placed on microcomputers are not technical but those of the imagination. Quite simply, we have yet to explore the real potential of these machines.

What we need is for people who are familiar with microcomputers to look at everyday situations in a new light. Why not suggest to your friends and colleagues ways in which microcomputers could make their lives easier?

Next Week



Can you land your lunar module before your fuel runs out? Find out in Moon Lander — a new game for Vic20.



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Spectrum gift for Japanese Premier

A ZX Spectrum microcomputer was presented to Mr Zenko Suzuki, the Japanese Premier, by Prime Minister, Mrs Thatcher, during her official visit to the country in September.

The informal presentation took place before a dinner reception held for Mr Suzuki at the British Embassy.

Mrs Thatcher ran a short program drawing the flags of the two countries to demonstrate the machine to the Japanese Premier. A Downing Street spokesman said that Mr

Suzuki seemed delighted with the gift, and that "the Spectrum was chosen as an example of recent British high-technology".

The event followed a meeting earlier this year between Clive Sinclair and Mrs Thatcher. Representing Sinclair Research in Japan was John Mathieson of the company's technical staff. He said that the Spectrum was one of three specially constructed for the event and designed to work with the Japanese 60Hz, 525 lines tv network.



Prime Minister Mrs Thatcher.

"The presentation had been in the pipeline for about a month but it all happened very quickly. Clive telephoned me two days before and said they wanted somebody to demonstrate the system. I said 'Where? Downing Street'. He said 'No, Tokyo'."

Texas offers £50 refund on TI99-4A

A £50 cash rebate is being offered by Texas Instruments on purchases of its TI99-4A home computer, in an attempt to shore-up its flagging sales in time for the Christmas market.

Buyers of the TI99-4A, at its normal retail price of £199, will be given a form which can be presented to TI for the £50 cash refund.

The scheme will run from October 15 until the end of January. TI will then decide whether to convert the rebate into a firm price reduction.

TI Marketing Manager, Irfan Salem, says that the home computer market has gone very quiet for TI. It has the option of either cutting the price or of advertising heavily in the national press. Having chosen to cut the price, the rebate scheme offered the quickest way of getting the effect through to the customer.

A similar scheme was launched in the United States in August and is reported to have increased sales by a factor of eight.

Irfan Salem believes that the effect of the rebate will be to help bridge the gap between the home computer and the video game market. This will bring the TI99-4A into close competition with the ZX Spectrum and prepare the ground for the expected price reductions on all the Commodore Vic range and the launch of the new Commodore 64.



The 16K Oric 1 will cost £99.95 and will include eight colours and a 240x200 high-resolution display.

Oric 1 launch in mid-November

THE much-awaited Oric 1 microcomputer will be launched in mid-November.

Two versions of the machine, a 16K model at £99.95 and a 48K model at £169, will be produced. Both will feature an enhanced form of Microsoft Basic, 8 colours (programmed like the Spectrum as Ink and Paper), 40 x 28 teletext compatible low-resolution screen with full editing and 240 x 200 high-resolution display. Also provided are four voices (three music, one noise) with seven octaves and envelope control, and four pre-programmed sound commands — Zap, Explode, Shoot and Ping.

The Oric is fitted with an expansion connector, Centronics port and audio and video

monitor outputs. A modem, printer and discs are planned. The modem will come first at £59.95, followed by the printer at about £160, both scheduled for Spring 1983.

Oric Products, who will produce the machine, has been formed to combine the design expertise of Tangerine Computer Systems and the financial backing of British Car Auctions.

Tangerine's Paul Kaufman said: "The Oric is a competitor for the Spectrum. We are convinced that it is a better machine and we have a lot of big distributors keen to take it on."

Initially it will sell by mail-order and be distributed by Tangerine Computer Systems, Science Park, Cambridge.

Prism to make new software for ZX81

THE ZX81 is having a range of software built for it by Prism Microproducts, its UK wholesaler.

Its hardware, now being sold through video, hi-fi stores and newsagents, is at present accompanied by a selection of 32 Sinclair Research/CCL software cassettes.

This range is to be broadened to include tapes from many leading software producers.

Prism's Managing Director, Bob Denton, said: "The market has changed — it is no longer mail-order, it is retail. We have a huge potential number of retail outlets that have never been available to many of the software companies. We have written to everybody who, as far as we know, has produced material for the ZX81, and many have submitted samples to us. Any software passing our quality assessment will be included to augment the Sinclair catalogue," he said.

Mark Eyles of the software company Quicksilver echoed his comments. "Software is no longer a specialist market," he said. "The ZX81 is now a true High Street microcomputer and we get very few cassette mail-orders now. Quicksilver is in contact with Prism. If the ZX81 is to be sold in newsagents then that is where we want our tapes."

ZX81 puts on its snow shoes for Austria

SINCLAIR launched the ZX81 in Austria on September 30. Distribution will be handled by Sinclair's Austrian agent Electronova.

Dr Lagler, head of Electronova, hopes to sell 5,000-10,000 ZX81s by Christmas.

This move follows the success of ZX81 sales elsewhere in Europe. France has sold more than 50,000 ZX81s since October 1981, and West Germany almost as many.

Other countries which now sell the ZX81 include Spain, Italy, Denmark, Belgium, Holland, Switzerland, Norway and Sweden.

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The Working Spectrum is published by Sunshine Books, in association with Popular Computing Weekly.

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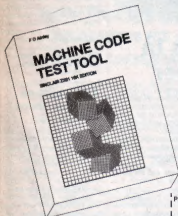
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Letters

write to Letters, Popular Computing Weekly, Hobhouse Court, 19 Whitcomb Street, London WC2

A rose by any other name

Elvis Cinclear is pleased to announce his new home computer, the 'Cinclear Rainbow'. It will sell for £124.99 for the 17K or £174.99 for the 49K version and is designed to replace my ZX18.

For the technically minded, it has 257 x 193 hi-res graphics with 39 different colours (30 of which are the same) and can play Beethoven's 9th (with additional music Rom). In about a year or two we will introduce the new 'Cinclear Maxidrive', a very small disc drive designed to look like a big one, and an RS232/network interface board to connect your micro up to three power stations at once.

To purchase a Rainbow, please send your cheque made out to 'Cinclear Research Ltd' with an SAE to return the money after four months.

Elvis Cinclear
Cinclear Research Ltd
[Directors: Elvis Cinclear and his Mum]
83 Cornwall Road
Bishopston
Bristol

Constructive criticism

I would like to air a couple of criticisms that I hope you will find constructive. Both refer to *Popular Computing Weekly*, September 9.

Re the Editorial: "... I just wish the Jupiter Ace was colour instead of black and white ...". I hope that the micro business has not reached such a level that, as soon as a new micro is brought out, every other manufacturer has to follow suit, with features almost identical to its competitor. I rarely use the colour on my Commodore Vic, but just revert to white text on an all-black background.

The way that the sentence was written seems to say that the writer of the editorial is now thoroughly fed-up with any computer except those that offer the facilities of colour display.

Re 'Jupiter Ace makes Forth bid for stardom'. I got fed-up with the way the author seemed to use Basic as the language against which all others are judged. "... — a

fear of the unknown? — ... "?????" People have the option of writing programs in whichever language they choose, and it is unfair to say that one language has superiority over another. They each have their own advantages and disadvantages, so why can't the two exist quite happily side-by-side instead of aiming towards an either/or situation.

I am 15 years old and have been programming microcomputers for two years. During that time I have learnt to program in Basic, Algol, Pilot, Forth and two machine codes. I have even written my own Pilot interpreter for the Commodore Pet. There is nothing really difficult about learning another computer language, as long as it is tackled properly. So why be afraid of it? '2.5 +' is not at all unnatural once you have read a little on how Forth computes its arithmetic.

Apart from those two points, I consider your mag to be one of the best on the market today (grovel ... grovel).
PS BRING BACK CITIZEN PAIN!

D Belchamber
23 Croftlands Avenue
Stubbington
Fareham
Hampshire PO14 2JR

Far from being thoroughly fed-up with black and white micros, I am an avid fan of machines such as the ZX81 and the Acorn Atom.

However, there is no doubt that the vast majority of microcomputer users prefer colour to black and white. Hence the massive interest shown in the Spectrum, Dragon 32 et al.

While I was most impressed with the Jupiter Ace, and wish both it and its inventors well, I think it would be a far more commercial proposition if it was a colour machine.

As for Boris Allan's review of the Jupiter Ace, he was comparing Forth with Basic simply because Basic is the language most commonly used by micro enthusiasts. As you rightly point out, there are advantages and disadvantages to both languages.

Finally, Citizen Pain. Our readers seemed to either love him or hate him. Unfortunately, most of them seemed to hate him.

And now a Dragon!

Dragons are being tamed north of the Border!

Upon capturing my beast and feeding him a diet of the Dragon manual (162 pages), the quick reference guide and an errata sheet, he is still longing for more. It is a thankless task, and unless I can feed him plentiful data about the high-resolution graphics capabilities, he threatens to toast me to a frazzle.

So please, please, could you print a listing using PmODE, Point, Get, Put, Poopy, Pclear etc and try to clarify my predicament.

I'm sure that other Dragon tapers are having this problem with their beasts.

I must run now, its all go with a Dragon to look after.

Paul Richardson
17 Gordon Terrace
Aberdeenshire
Scotland

Our first Dragon program was published in our September 30 issue. Further programs and articles will follow. After all, we have no desire to be toasted to a frazzle either.

Logan's Rom

After Dr Logan's request for Rom bugs in the ZX Spectrum (*Popular Computing Weekly*, September 9), I felt I had to respond because I reckon I have found the best one yet. To see it in action, simply type in a line number followed by a space or number of spaces and press enter. The Spectrum will respond by placing the line number in the listing. The program will still run OK, and the lines act like Rems.

As an example, try: 10 space Enter, and the listing will just say 10.

I am sure this is worth a free copy of Ian Logan's new book (hint, hint), ask him what he thinks.

W J Day
17 James Watt Avenue
Corby
Northants NN17 1BX

Disappearing tricks

Ian Logan's letter on Spectrum bugs in your September 9 issue was most interest-

ing. Your readers may care to investigate a couple of the points he makes with the following simple program:

10 FOR A = -65536 TO -65540
STEP -1: PRINT A, INT A
NEXT A

Use this to find the magic disappearance of the number -65536 and the inability of the loop ever to come to a halt.

At the same time, as you continually meet the "scroll?" prompt, try Ian's suggestions for strange responses to this. What Ian doesn't actually say is that after one has used some combinations of these responses, the response "n" to the prompt does not operate.

Eric Deeson
4 Ethel Road
Harborne
Birmingham
B17 0EL

Reader's request

Within the next few months a large number of primary schools will be ordering (and hopefully receiving) a microcomputer under the Department of Industry Scheme. Some teachers may be content to rely solely on professionally produced software, but most, I suspect, will also want to have a go at producing their own programs.

As a primary teacher with a BBC micro, I would be interested in hearing from anyone who would consider joining a BBC users' group that would suggest, develop and exchange (by post): a) short programs designed for children aged 5-11; together with b) notes on how the programs, and others that become available for the BBC micro, might be best used and adapted.

Please send a SAE — along with any ideas you might have for such a Users' Group — to me.

J Sheard
31 Glen Court
Avenue Road
Wolverhampton
West Midlands WV3 9JW

If you have an opinion you want to express, or have spotted an error that needs correcting, write to: Letters, Popular Computing Weekly, Hobhouse Court, 19 Whitcomb Street, London WC2.

Asteroids

A new game for 16K Spectrum

by Antony Ascroft

This is a game in which you have to dodge rocks which come towards you. The game starts with a pause (in which the computer sets up the characters needed in the game). It then asks for your name and the required level of difficulty.

Asteroids start at the bottom of the screen and work their way to the top. Your aim is to dodge the rocks and collect as many points as possible. You move the ship by the keys 5 (left) and 8 (right). To fire press 0.

When you fire, a missile goes down the screen five rows. If it hits an asteroid it blows up. Shooting a spaceship gives you an extra 25 points. But, watch out for debris.

If you get past a batch of 100 asteroids, then you get another missile — you only have 10 to start with. But you also move down the screen one row, which makes the game harder as it progresses.

When you finally collide with an asteroid, you are given your score and the highest score on that level.

There are several sub-routines, which are listed below:

6-49	Sets variables and colour.
160-176	Main part of program.
219-265	When the game is over.
400-479	Missile launch.
560-563	Start of game.
1009-1842	Creates the characters.
1850-1899	Data for characters.
2090	Data for different levels.

Remember when you first put the program in that the characters have not yet been formed. So, put the computer into graphic mode and then press the relevant key:

In line 119 the symbol is graphic A
In line 130 the symbol is graphic B
In line 135 the symbol is graphic C
In line 429 the symbol is graphic D
In line 469 the symbol is graphic E




```

1 REM 2
2 REM 2 Antony Ascroft
3 REM ASTROIDS SPECTRUM 16K
4 BORDER 2: PAPER 1: CLS : IN
K 7
5 POKE 23689,255: POKE 23685,
255
6 LET v=0
7 LET f=10
8 DIM v(5): DIM h$(5,12)
9 GO SUB 1000
10 LET a=10
11 GO TO 500
12 LET c=0
13 LET f=10
14 LET a=0
15 REM main program
16 FOR n=1 TO 100
17 LET b=INT (RAND*16)
18 LET c=c+1
19 POKE 23689,255
20 PRINT AT 5,5: INK 5: "a"
21 LET a=a+(INKEY$="0")+1+(-1)
22 IF INKEY$="R": AND (a=1)
23 IF a=0 THEN LET a=1
24 IF INKEY$="E" THEN GO TO 40
25
26 IF a=32 THEN LET a=31
27 PRINT AT 21,0: "a"
28 PRINT TAB 0: "a"
29
30 IF INT (RAND*20)=5 THEN PRIN
T TAB 0+1+INT (RAND*15): INK 5: "a"
31 BEEP .1,50
32 IF a=0: SCREEN$ (a+1,a)
33 THEN GO TO 200
34 BEEP .1,50
35 NEXT a
36 BEEP .25,1
37 LET c=c+10
38 LET a=a+(a<17)
39 LET f=f+1
40 GO TO 50
41 CLS
42 PRINT AT 5,2:bs: " You score
43
44 PRINT AT 5,2: "You had "f:"
45 MISSILES left
46 BEEP 1,5: BEEP 1,9: BEEP 1,
47
48 PRINT AT 5,10: FLASH 1: "PRE
49 ENTER FOR": PRINT AT 9,10: FL
50 ASH 1: "ANOTHER"
51
52 IF (v(1)) THEN GO TO 550
53 PRINT AT 11,0: "Highest scor
54 at level "z: was 50 "h$iz,
55 1 TO 1: "Who got "v(z)
56 INPUT a$
57 CLS
58 GO TO 500
59 IF f=5 THEN GO TO 150
60 LET f=f-1
61 FOR a=1 TO c+5
62 IF ATTA (a,a)=143 THEN GO T
63 0 420
64 IF SCREEN$ (a,a)="" THEN
GO TO 450
65 PRINT AT 5,a: "a"
66 BEEP .25,50
67 IF ATTA (a,a)()143 THEN PRI
68 NT AT 5,a: " "
69 NEXT a
70 GO TO 150
71 IF ATTA (a,a)=14 THEN LET c
72 =c+25: BEEP .2,30: BEEP .2,5
73 PRINT AT 5,a: FLASH 1: "x"
74 BEEP .15,30
75 GO TO 150
76 INPUT "What is your name "
77 b$
78 INPUT "Level 1-5 (5 hard) "
79 z
80 IF z>5 THEN GO TO 500
81 FOR i=1 TO z: READ j: NEXT
K
82 RESTORE 2000
83 GO TO 30
84 LET v(1)=c: LET h$(1)=bs
85 GO TO 240
86 FOR a=1 TO 5
87 READ a$
88 FOR n=5 TO 7
89 READ a: POKE USR a$+n,a
90 NEXT n
91 RETURN
92 DATA "a",0,0,0,24,50,120,24
93
94 DATA "b",0,24,44,110,120,50
95 24,0
96 DATA "c",0,0,0,10,54,40,55,0
97 DATA "d",0,10,10,10,54,50,1
98 0
99 DATA "e",0,73,42,20,127,20,
100 42,73
101 DATA .20,.17,.13,.07,.03,0

```

The two faces of Nigel Searle

David Kelly talks to the head of Sinclair's computer division.

Nigel Searle studied mathematics and computer science at Lancaster University and then did a PhD in artificial intelligence at Edinburgh. For the past 10 years he has been involved in one way or another with the Sinclair companies.

Originally, he worked on the design of the Sinclair scientific and programmable calculators. Then he ran the company's American office in Boston for two years. In March this year he returned to the UK as head of the computer division of Sinclair Research, responsible for all activities in the company relating to computers.

One of his first achievements was to persuade the Department of Industry to include Sinclair's Spectrum in the government's £9m "Micro in Primary" scheme. The ZX81 was a notable absentee from the government's earlier scheme to put a micro in every secondary school.

"Just after I got back to the UK, before the Spectrum was announced in April, I heard rumours that the Department of Industry was going to announce a Primary Schools Scheme this summer," explains Searle. "We asked to show them our new computer. When we approached them they had actually made their choice of machines for the scheme, but they agreed that the Spectrum was suitable and decided to include it."

Searle also recognised the potential inherent in Prestel for micro users. A Prestel adaptor for the Spectrum should be launched early in the new year.

"Prestel is a great opportunity with a tremendous capacity, but has so few users," says Searle. "It isn't making headway because it is too expensive and difficult to use, but you have to consider not what benefit people get from it now but what they will get in the future. Kids will do more of their learning from computers and many people will work from home."

"As far as Sinclair is concerned, all these things mean that we shall be becoming more and more involved in writing and marketing software as a matter of strategy."

"The computers we are designing are becoming ever more complex and will be of little use without the software to run on them. The ZX81 is a learning machine. The Spectrum, with microdrives, is altogether different. Somebody is going to produce the software to go with it and it might as well be us!"

"The profits to be made on software are high. The value of the product is its content, rather than the cost of the tape and container. It is obviously attractive for us to get into that. Besides, it is going to be increasingly difficult to make money out of the hardware. Already the business is

becoming very cut-throat with so many new machines."

"In the past we have always sold our computers mail-order, but the market place is changing. We would not want to stand by and not give people the chance of choosing a Sinclair."



Nigel Searle - opening up new markets.

"We had an exclusive arrangement with WH Smith and there was a time when this was advantageous. But it did seem that many retailers were starting to sell microcomputers and we had to take advantage of that so we are now retailing the ZX81 through wholesalers, Prim Microproducts."

"We will retail the Spectrum sooner than we did the ZX81 because of the changing market. Besides, it will be easier to sell the Spectrum through those outlets already selling the ZX81 than it was to set these outlets up in the first place."

"Our machines are now being sold in the United States under the Timex banner. All the indications are that they are going to be extremely successful. Timex now have the largest share of the US market within six weeks of beginning to sell the Sinclair Timex 1000 and it seems very likely that they will become the dominant computer manufacturer."

"I would expect them to market a Spectrum-like product over there sooner rather than later. Their objective is to get in phase with us. We have the technology, and, if it is worth having, then it is worth having as soon as possible. I am sure that soon they will be selling products in the American market as soon as we can develop them."

"Sinclair Research is changing. It has always been a technology driven company with no great emphasis laid on exploiting the market. We will now sell not just by the most profitable route but by any route that is sufficiently profitable."

"As far as Spectrum deliveries are concerned I recognise that the customers are not satisfied. We have tried to respond with letters to those who have ordered the machines but it is very difficult."

"The scary thing about it was not simply that we weren't producing enough machines, but that we didn't seem able to control the numbers we produced even with relatively small numbers. We have not been able to predict with confidence how many we would produce in a week. This is what our customers could not accept — that we were just unable to tell them when they would get their machines."

"We can now do this. Production, while still not as high as we would like, is now smooth and regular, a far cry from three weeks ago. We'd be running along nicely producing X hundred a day and then suddenly we'd hit a problem. We have had difficulties with new suppliers and there have been design problems."

"On a day when we might have hoped to make 400 Spectrums we might have made only 40. The Ram expansion unit was the main problem and we are only now getting back to the sort of production levels we were at before Timex went on their annual three-week holiday in July."

"When they came back from holiday we all had high hopes. The Ram expansion board had been causing assembly problems, so we designed a new main printed-circuit board incorporating the Ram expansion. But the tracking on the new board was very fine and the tolerance of the whole job went down. In retrospect we might have been better advised to have stuck with the original boards."

"We of course have to accept responsibility for this — after all we got ourselves into the problem. But the customers didn't seem to understand that we didn't know when they would get their machines."

"I suppose I would have felt as they did if I had ordered one. I accept our mistake in having a product that could not be reliably produced. It may not seem so —



Remembering recent problems.

but we have spent an absolute fortune in customer service in the last few months — far, far more, I assure you, than any interest accruing from the money orders we have received."

"Now that there are signs that the production of the Spectrum is increasing, we can begin to think of new projects."

"Our design department has never been so strong. We obviously intend to go on producing new computer products. We have no plans to launch a new printer immediately but we shall be producing the microdrives for the Spectrum very early in the new year."

Machine Code

Ian Stewart and Robin Jones present a new series for beginners

Calling all branches

So far, our instruction set looks a bit thin. We have *Ld* and *St*, which will move things around memory. *Add*, which is pretty primitive arithmetic, and *Hlt* to stop the program.

We can pep up the arithmetic capability a bit by adding *Sub*, which will subtract the contents of a location from the A-register. But, there are no instructions for multiplication, division or the calculation of square roots.

What we really need is a set of branch instructions, equivalent to Basic's *IF*...*Then*...

It is fairly easy to branch to an instruction out of the usual sequence, all you need to do is change the contents of the PC register. So we'll use an instruction like:

JP416 (jump to 416)

Whenever it is executed, it will put 416 in the PC. The system is "fooled" into thinking that the next instruction is in 416. Then it will go on to 417, 418, etc, until the next "jump" instruction is encountered. Of course, any address can follow the *Jp* opcode.

This instruction is more like a *Goto* than an *IF*...*Then*... statement. What we need is an instruction which resets the PC only if some condition is met. The simplest test we can make is whether the A-register contains zero:

JPZ 2A7 (jump to 2A7 only if A-reg. contains 0)

Another would be:

JPN 14E (jump to 14E only if A-reg. contains 0 or negative)

That is the minimum we can get away with, because we can now test for a positive (non-zero) number by noting when the program doesn't jump on either *Jpz* or *Jpn* instructions.

Subroutines and Stacks

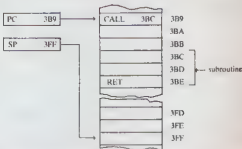
While on the subject of transferring control from one place to another inside the program, how about something like Basic's *Gosub* and *Return*?

We'll have an instruction:

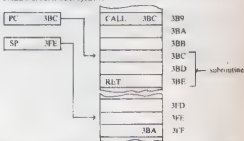
CALL 205 (call the subroutine starting in 205)

which puts 205 into the PC, just like a *Jp* opcode. But, *Call* also performs a second function — it stores the address of the instruction after the *Call*, so that when a "return" (opcode: *Ret*) is encountered it can load the stored address back into the PC to continue the main program where it left off.

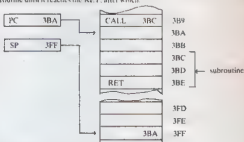
This is where the SP register comes in. We use some of the memory as a stack (remember stacks?) and SP points to the top of the stack. When a *Call* is obeyed, the return address (the address of the *Call* + 1) is pushed on to the stack. When the *Ret* is encountered the stack is popped into the PC. Here's an example:



The CALL is about to be obeyed.



Now it has been, and the return address is on the stack. The program steps through the subroutine until it reaches the RET, after which:



and control is back inside the main program.

Reproduced from *Machine Code and better Basic*, by Ian Stewart and Robin Jones (price £7.50), by kind permission of Shiva Publishing Ltd, 4 Church Lane, Nantwich, Cheshire CW5 9RG.

If you have any machine code subroutines/tips/games, please send them to: Machine Code, Popular Computing Weekly, Hobhouse Court, 19 Whitcomb Street, London WC2 7HF.



Colour Genie upholds evolutionary theory

David Kelly finds that his wish is not always the Colour Genie's command.

The Colour Genie is the natural successor to the Video Genie. Manufactured by EACA International in Hong Kong and imported by Lowe Electronics, the Colour Genie costs £199.

Like its EACA predecessors, the Colour Genie is based around the Z80 chip. It has 16K Rom and 16K Ram, nine colours, three sound channels and runs a version of Extended Microsoft Basic.

The first thing that strikes you about the Colour Genie is the large size of its box. Inside is the machine itself, two booklets, cassette and tv leads, and a demonstration tape.

The thinner of the two booklets is an introductory manual, telling you what to plug where and how to build up simple programs. It is co-authored by Robin Bradbeer who wrote similar notes for the Spectrum. The second booklet is a more detailed technical description of the micro's capabilities.

The introductory manual opens with "Congratulations on purchasing a Colour Genie microcomputer. You are now the proud owner of one of the most sophisticated personal computers available. Take the computer out of the box carefully and attach an appropriate plug to the mains lead." Unfortunately, you will not be able to find out just how sophisticated the Genie is if you have not already bought a plug.

Hardware

Removed from its protective foam packaging and set down on the dining room table

the Colour Genie looms large. It is almost 1½ feet wide and 1 foot deep. The case consists of dark-brown and white plastic and is rather unimaginative.

The series of parallel grooves running up the right-hand side of the keyboard, incorporating the loudspeaker grill, are fictitious rather than functional — there is no speaker underneath. The machine's audio output is through the tv.

The keypad is a full-size, well laid out, Qwerty board. The Break key is well away from the Return key and there is a full-length space bar. The two interlocking Reset keys are a good idea — both must be pressed simultaneously before the system resets. It is a pity that +, = and - are all shifted symbols. The keyboard is angled in a similar way to the Commodore machines so that the 64 preprogrammed graphics characters can be displayed on the front of the keys. They are selected in conjunction with the Control function.

Unshifted letters are capitals. To get the lower-case letters the Shift key is used. The feel of the keys was not wholly to my liking — they depressed too far and were rather springy.

On the right of the keyboard are the four function keys. To the left is a neon light, to indicate if the machine is connected. There is an on/off switch in the back.

Also at the back are the tv output, Rom cartridge port, cassette input/output and monitor audio and video outputs. These latter outputs are useful but the choice of phono for the video output is unusual. The parallel and serial input/output ports and light-pen port are located on the right-hand side. The cassette, serial and light-pen sockets are all sensibly Din.

Before considering what the Colour Genie does with this hardware let me briefly look inside. The keyboard and top of the casing hinge away from the back. The transformer and associated power supply is on the left. Almost the whole of the Genie's circuitry is contained on one large printed-circuit board, which accounts for the bulky casing. There is a fair amount of excess space inside the machine — rather like the Dragon.

There are over 60 chips on the board including the Z80 processor, display chip and sound chip. Also on the board, at the power supply end, is the Pal colour UHF modulator. The pcb appears well constructed and the tracks on the board are reasonably solid.

Most new microcomputers these days have an external power supply to avoid possible overheating. Although the Colour Genie has an integral power supply it has an adequately heat-sink and, even after prolonged use, I could detect no such problem.

Software

The Colour Genie runs its own version of the now increasingly popular extended Microsoft Basic.

In the standard low-resolution graphics mode there are 24 rows and 40 columns. Information is directed onto the screen using the Print @ n, "X" command. X is the letter or figure to be printed and n can be any number between 1 and 960, corresponding to the 960 possible screen positions. (For example, if n is 40 this denotes the first character on the second line.) This is different from some other machines, where both the row and column have to be specified.

The low-resolution mode can define up to nine colours — black, white, green, red, yellow, orange, blue, cyan and magenta. These are formatted using Colour N, where N is 0 to 8.



Colour Genie
and its
Qwerty keyboard.



Back view (above)
showing Rom car-
tridge, cassette and
TV/IO ports.

The high-resolution mode is entered by depressing the *Control* and *Mode Select* keys simultaneously. Low-resolution is restored by pressing the keys again.

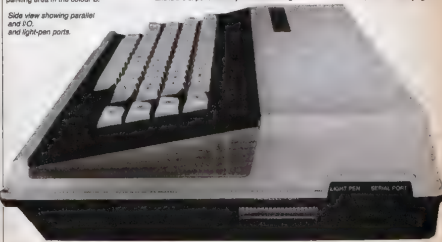
Alternatively, high-resolution mode can be called during a program using the command *Fgr*. Low-resolution is restored using the command *Lgr*.

All programming is carried out in the *Lgr* mode. When a program involving high-resolution graphics is run the other mode has to be switched in and out using the *Fgr* and *Lgr* commands. The cursor line is not visible in *Fgr* mode.

The high-resolution page is 160 x 80 and can be defined in four colours — black, blue, red and green. These are formatted by *Fcolor N*, where *N* is 1 to 4.

In the high-resolution mode there are several useful commands. *Plot X1,Y1 to X2,Y2* draws a line between two points. *Circle X,Y,R* draws a circle, centre at *X,Y* and radius *R*. *Shape X,Y* draws a figure, beginning at *X,Y* defined by the user with individual bytes determining up, down, left, right and the colours. *Paint X,Y,C,B* colours in a close contour starting at *X,Y* with the colour *C*, leaving the boundary of the painting area in the colour *B*.

Side view showing parallel
and IO ports.



to do with the cursor. *→* moves the cursor, not one space to the right, but to the start of the next screen field or *Tab* location. This is sensible otherwise it would merely be a duplication of the space-bar.

A special feature of the Colour Genie allows the character, size and frequency of blinking of the cursor to be redefined to the user's preference.

The editing sequence is built around a set of operating key letters which can be used to change the existing text. First type in *Edit X*, where *X* is the line number of the line you wish to change. The computer enters the edit mode and the line to be changed is selected. Typing *L* brings the line down and displays it with the flashing cursor at its start.

Move the cursor along the line, using the space-bar or cursor keys, until the section to be changed is reached. At this point any number of edit-mode sub-commands can be applied.

Each of these sub-command letters is followed by the relevant correction to the text. The *C* key followed by an entry changes the character immediately after the cursor. The *I* key followed by an entry inserts a new character immediately after the one on which the cursor rests. The *D* key deletes the character after the cursor.

To aid editing, the character is only deleted when the changes are saved and the command mode is reinstated. During editing the deleted characters are still displayed but are shown flanked by two | symbols.

Continued on page 22



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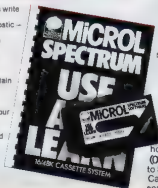
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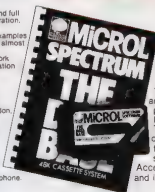
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How to contribute

Each week the editor goes through all the programs that you send to Open Forum in order to find the Program of the Week.

The author of that program will qualify for DOUBLE the usual fee we pay for published programs. (The usual fee is £10.)

Presentation hints

Programs which are most likely to be considered for the Program of the Week will be computer printed and accompanied by a cassette.

The program will be well documented, the documentation being typed with a double spacing between each line.

The documentation should start with a general description of the program and then give some detail of how the program has been constructed and of its special features.

Listings taken from a ZX Printer should be cut into convenient lengths and carefully stuck down on to white paper, avoiding any creasing.

Please enclose a stamped, self-addressed envelope.

Logic Circuit

on Spectrum

The program enables you to plot out a logic circuit on the screen using numerous facilities to aid you. All the logic circuit symbols are user defined, these symbols are for And, Or, Not, Nand and Nor.

The program does not have to be used for plotting logic circuits, as it could be used as a "sketch pad".

The programs facilities are:

Move cursor, slow or fast.

Plot in any colour.

Use logic symbols.

Save the screen display on tape.

Load a screen display from tape.

Draw a line from A to B.

Draw a circle with centre at cursor and input radius.

Clear screen.

Help.

Full instructions are included in the program.

```

8 REM LOGIC CIRCUIT PLOTTER
9 REM © ANDREW FILBY 1988
10 DIM A(255)
11 LET A=0: LET L=10
12 LET PL=0
13 REM PRINT AT 0.0, OVER 1:
14 PRINT "LOGIC CIRCUIT PLOTTER"
15 PRINT "BY ANDREW FILBY"
16 PRINT "© 1988"
17 PRINT "PRESS 0 TO END"
18 PRINT "PRESS 1 TO START"
19 PRINT "PRESS 2 TO SAVE"
20 PRINT "PRESS 3 TO LOAD"
21 PRINT "PRESS 4 TO CLEAR"
22 PRINT "PRESS 5 TO HELP"
23 PRINT "PRESS 6 TO SAVE"
24 PRINT "PRESS 7 TO LOAD"
25 PRINT "PRESS 8 TO CLEAR"
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175 PRINT "PRESS 158 TO CLEAR"
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578 PRINT "PRESS 561 TO HELP"
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581 PRINT "PRESS 564 TO SAVE"
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583 PRINT "PRESS 566 TO CLEAR"
584 PRINT "PRESS 567 TO HELP"
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594 PRINT "PRESS 577 TO LOAD"
595 PRINT "PRESS 578 TO CLEAR"
596 PRINT "PRESS 579 TO HELP"
597 PRINT "PRESS 580 TO END"
598 PRINT "PRESS 581 TO START"
599 PRINT "PRESS 582 TO SAVE"
600 PRINT "PRESS 583 TO LOAD"
601 PRINT "PRESS 584 TO CLEAR"
602 PRINT "PRESS 585 TO HELP"
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607 PRINT "PRESS 590 TO CLEAR"
608 PRINT "PRESS 591 TO HELP"
609 PRINT "PRESS 592 TO END"
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611 PRINT "PRESS 594 TO SAVE"
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614 PRINT "PRESS 597 TO HELP"
615 PRINT "PRESS 598 TO END"
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617 PRINT "PRESS 600 TO SAVE"
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625 PRINT "PRESS 608 TO CLEAR"
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638 PRINT "PRESS 621 TO HELP"
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641 PRINT "PRESS 624 TO SAVE"
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643 PRINT "PRESS 626 TO CLEAR"
644 PRINT "PRESS 627 TO HELP"
645 PRINT "PRESS 628 TO END"
646 PRINT "PRESS 629 TO START"
647 PRINT "PRESS 630 TO SAVE"
648 PRINT "PRESS 631 TO LOAD"
649 PRINT "PRESS 632 TO CLEAR"
650 PRINT "PRESS 633 TO HELP"
651 PRINT "PRESS 634 TO END"
652 PRINT "PRESS 635 TO START"
653 PRINT "PRESS 636 TO SAVE"
654 PRINT "PRESS 637 TO LOAD"
655 PRINT "PRESS 638 TO CLEAR"
656 PRINT "PRESS 639 TO HELP"
657 PRINT "PRESS 640 TO END"
658 PRINT "PRESS 641 TO START"
659 PRINT "PRESS 642 TO SAVE"
660 PRINT "PRESS 643 TO LOAD"
661 PRINT "PRESS 644 TO CLEAR"
662 PRINT "PRESS 645 TO HELP"
663 PRINT "PRESS 646 TO END"
664 PRINT "PRESS 647 TO START"
665 PRINT "PRESS 648 TO SAVE"
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667 PRINT "PRESS 650 TO CLEAR"
668 PRINT "PRESS 651 TO HELP"
669 PRINT "PRESS 652 TO END"
670 PRINT "PRESS 653 TO START"
671 PRINT "PRESS 654 TO SAVE"
672 PRINT "PRESS 655 TO LOAD"
673 PRINT "PRESS 656 TO CLEAR"
674 PRINT "PRESS 657 TO HELP"
675 PRINT "PRESS 658 TO END"
676 PRINT "PRESS 659 TO START"
677 PRINT "PRESS 660 TO SAVE"
678 PRINT "PRESS 661 TO LOAD"
679 PRINT "PRESS 662 TO CLEAR"
680 PRINT "PRESS 663 TO HELP"
681 PRINT "PRESS 664 TO END"
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683 PRINT "PRESS 666 TO SAVE"
684 PRINT "PRESS 667 TO LOAD"
685 PRINT "PRESS 668 TO CLEAR"
686 PRINT "PRESS 669 TO HELP"
687 PRINT "PRESS 670 TO END"
688 PRINT "PRESS 671 TO START"
689 PRINT "PRESS 672 TO SAVE"
690 PRINT "PRESS 673 TO LOAD"
691 PRINT "PRESS 674 TO CLEAR"
692 PRINT "PRESS 675 TO HELP"
693 PRINT "PRESS 676 TO END"
694 PRINT "PRESS 677 TO START"
695 PRINT "PRESS 678 TO SAVE"
696 PRINT "PRESS 679 TO LOAD"
697 PRINT "PRESS 680 TO CLEAR"
698 PRINT "PRESS 681 TO HELP"
699 PRINT "PRESS 682 TO END"
700 PRINT "PRESS 683 TO START"
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702 PRINT "PRESS 685 TO LOAD"
703 PRINT "PRESS 686 TO CLEAR"
704 PRINT "PRESS 687 TO HELP"
705 PRINT "PRESS 688 TO END"
706 PRINT "PRESS 689 TO START"
707 PRINT "PRESS 690 TO SAVE"
708 PRINT "PRESS 691 TO LOAD"
709 PRINT "PRESS 692 TO CLEAR"
710 PRINT "PRESS 693 TO HELP"
711 PRINT "PRESS 694 TO END"
712 PRINT "PRESS 695 TO START"
713 PRINT "PRESS 696 TO SAVE"
714 PRINT "PRESS 697 TO LOAD"
715 PRINT "PRESS 698 TO CLEAR"
716 PRINT "PRESS 699 TO HELP"
717 PRINT "PRESS 700 TO END"
718 PRINT "PRESS 701 TO START"
719 PRINT "PRESS 702 TO SAVE"
720 PRINT "PRESS 703 TO LOAD"
721 PRINT "PRESS 704 TO CLEAR"
722 PRINT "PRESS 705 TO HELP"
723 PRINT "PRESS 706 TO END"
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725 PRINT "PRESS 708 TO SAVE"
726 PRINT "PRESS 709 TO LOAD"
727 PRINT "PRESS 710 TO CLEAR"
728 PRINT "PRESS 711 TO HELP"
729 PRINT "PRESS 712 TO END"
730 PRINT "PRESS 713 TO START"
731 PRINT "PRESS 714 TO SAVE"
732 PRINT "PRESS 715 TO LOAD"
733 PRINT "PRESS 716 TO CLEAR"
734 PRINT "PRESS 717 TO HELP"
735 PRINT "PRESS 718 TO END"
736 PRINT "PRESS 719 TO START"
737 PRINT "PRESS 720 TO SAVE"
738 PRINT "PRESS 721 TO LOAD"
739 PRINT "PRESS 722 TO CLEAR"
740 PRINT "PRESS 723 TO HELP"
741 PRINT "PRESS 724 TO END"
742 PRINT "PRESS 725 TO START"
743 PRINT "PRESS 726 TO SAVE"
744 PRINT "PRESS 727 TO LOAD"
745 PRINT "PRESS 728 TO CLEAR"
746 PRINT "PRESS 729 TO HELP"
747 PRINT "PRESS 730 TO END"
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749 PRINT "PRESS 732 TO SAVE"
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752 PRINT "PRESS 735 TO HELP"
753 PRINT "PRESS 736 TO END"
754 PRINT "PRESS 737 TO START"
755 PRINT "PRESS 738 TO SAVE"
756 PRINT "PRESS 739 TO LOAD"
757 PRINT "PRESS 740 TO CLEAR"
758 PRINT "PRESS 741 TO HELP"
759 PRINT "PRESS 742 TO END"
760 PRINT "PRESS 743 TO START"
761 PRINT "PRESS 744 TO SAVE"
762 PRINT "PRESS 745 TO LOAD"
763 PRINT "PRESS 746 TO CLEAR"
764 PRINT "PRESS 747 TO HELP"
765 PRINT "PRESS 748 TO END"
766 PRINT "PRESS 749 TO START"
767 PRINT "PRESS 750 TO SAVE"
768 PRINT "PRESS 751 TO LOAD"
769 PRINT "PRESS 752 TO CLEAR"
770 PRINT "PRESS 753 TO HELP"
771 PRINT "PRESS 754 TO END"
772 PRINT "PRESS 755 TO START"
773 PRINT "PRESS 756 TO SAVE"
774 PRINT "PRESS 757 TO LOAD"
775 PRINT "PRESS 758 TO CLEAR"
776 PRINT "PRESS 759 TO HELP"
777 PRINT "PRESS 760 TO END"
778 PRINT "PRESS 761 TO START"
779 PRINT "PRESS 762 TO SAVE"
780 PRINT "PRESS 763 TO LOAD"
781 PRINT "PRESS 764 TO CLEAR"
782 PRINT "PRESS 765 TO HELP"
783 PRINT "PRESS 766 TO END"
784 PRINT "PRESS 767 TO START"
785 PRINT "PRESS 768 TO SAVE"
786 PRINT "PRESS 769 TO LOAD"
787 PRINT "PRESS 770 TO CLEAR"
788 PRINT "PRESS 771 TO HELP"
789 PRINT "PRESS 772 TO END"
790 PRINT "PRESS 773 TO START"
791 PRINT "PRESS 774 TO SAVE"
792 PRINT "PRESS 775 TO LOAD"
793 PRINT "PRESS 776 TO CLEAR"
794 PRINT "PRESS 777 TO HELP"
795 PRINT "PRESS 778 TO END"
796 PRINT "PRESS 779 TO START"
797 PRINT "PRESS 780 TO SAVE"
798 PRINT "PRESS 781 TO LOAD"
799 PRINT "PRESS 782 TO CLEAR"
800 PRINT "PRESS 783 TO HELP"
801 PRINT "PRESS 784 TO END"
802 PRINT "PRESS 785 TO START"
803 PRINT "PRESS 786 TO SAVE"
804 PRINT "PRESS 787 TO LOAD"
805 PRINT "PRESS 788 TO CLEAR"
806 PRINT "PRESS 789 TO HELP"
807 PRINT "PRESS 790 TO END"
808 PRINT "PRESS 791 TO START"
809 PRINT "PRESS 792 TO SAVE"
810
```

Open Forum

moving the "bits" of character one position left. Program 2 loads in the machine code.

To print a 8 x 8 character:
1 POKE 64000,0: REM ASCII code of character
2 POKE 64001,0: REM the column lines
3 POKE 64002,0: REM 175-8 times line
4 RANDOMIZE USR 63009

It is also possible to print over the lines, or set other widths for the characters by changing "b" in line 2 to "column lines" and "n" and POKe 63016, "n" ("n" = 1 to 8). To make the ROM's PRINT use the new character set: POKE 23806,224: POKE 23607,250.

Program 1

```
10 CLEAR 62000
20 FOR X=256 TO 144
30 LET A=PEEK(15380+X)
40 IF A>127 THEN LET A=A-128
50 POKE 64224,X:A+2
60 NEXT X
```

Program 2

```
10 CLEAR 62000
20 FOR X=63000 TO 63080
30 READ A
40 POKE X,A
50 NEXT X
60 DATA 38,9,58,8,250,111,41,41,17,254,258,28,
61 6,9,14,6,86,281,34,229,89,248,13,8,8,8,
62 32,245,35,9,8,0,15,236,291
70 DATA 245,197,213,229,42,1,258,62,6,148,
71 133,79,129,132,71,295,229,34,225,298,193,
72 241,291,291,291
LD H,0
LD A,(64000)
LD L,A
ADD HL,HL
ADD HL,HL
ADD HL,HL
LD DE,64224
ADD HL,DE
LD B,8
LD C,8
LD D,(HL)
B LA 0
CALL C,63038
DEC C
JR NZ 6
INC HL
DJNZ 6
RET
```

Mini-maze

on Vic20

The player must move through a randomly generated maze to a star at the top of the screen in the shortest possible time. However, he may only move upwards and sideways — not backwards. If he crashes he receives five penalty seconds added to his time. Once only in the game the player may demolish the block in front of him, but this adds 10 penalty seconds to his time.

Keys used are:
'W', 'A' and 'D' to move;
'X' to demolish a block; and
'S' if you're stuck.

The main routines used in the 'Mini-Maze' program are:

```
1-100 Inverse variables
160-165 Draw maze
170-215 Test key pressed
240 Moves player up if no obstruction
300-307 Moves player left if no obstruction
310-317 Moves player right if no obstruction
320-325 Demolishes block in front of player
340 Zap sound effect
400-420 Explosion sound effect
480-490 End of game routine
510 Calculates time taken
```

Hex to Decimal

on Vic20

This program will probably be of most use to beginners. It will convert Hex to decimal. This is how it works.

Program notes:

```
5 Power to convert Hex to decimal.
10 Find Hex number to be converted to decimal.
11 If the input is nothing then re-run program.
20 Put Hex number into AS.
30 Last to first character of Hex number.
40 Add one to power to convert Hex to decimal.
50 If current character zero then goto line 40 because zero = ASC 0.
60 If current character ASC value is 9 then go and convert it to number. N.B. If character is not number or is "9" ASC value = 9. That is why line 30 is needed.
70 Converts current character in to decimal.
80 Add value of current character to decimal number so far.
90 Next character.
100 Print result.
110 Re-run program.
120 Put current characters in to BS.
130 If BS not letter between A and F then says it is illegal.
140 Converts letter to number.
150 Returns to loop.
```

```
PUSH AF
PUSH BC
PUSH DE
PUSH HL
```

```
LD HL,(64001)
LD A,S
SUB C
ADD A,L
LD C,A
LD C,A
ADD A,H
LD B,A
CALL 9933 ROM's PLOT
```

```
POP HL
POP DE
POP BC
POP AF
RET
```

by Paul Hampshire

```
5 D=1
10 INPUT HEX$;HNS
11 IF HNS="" THEN RUN
12 AS=HNS
13 FOR A=LEN(AS) TO 1 STEP -1
14 D=D*16
15 IF MID$(AS,A,1)="" THEN 40
16 IF VAL(MID$(AS,A,1))>9 THEN 40
17 IF VAL(MID$(AS,A,1))<0 THEN 40
18 B=VAL(MID$(AS,A,1))*(16^D)
19 Z=Z+B
20 NEXT A
21 PRINT "DECIMAL" C="HEX" HNS
22 RUN
23 DE=MID$(AS,A,1)
24 IF (ASC(DE)<48 OR ASC(DE)>59) THEN 10
25 THEN PRINT "ILLEGAL HEX NUMBER" C=HNS
26 DE=ASC(DE)-55
27 GOTO 45
```

Hex to Decimal
by Matthew Saxon

```
160 FOR I=91640 TO 9185:POKE I,0
2: NEXT I
165 POKE P,65:POKE P,0:
POKE 60,0
167 F1=1
170 GET A:IF A#="" THEN 170
180 0=0:IF A#="W" THEN 0=1
190 IF A#="A" THEN 0=2
200 IF A#="D" THEN 0=3
210 IF A#="X" THEN 0=4
215 IF A#="S" THEN 0=8
220 IF 0=0 THEN 170
230 UGGSUB 360,310,320,
330
240 IF PEEK(7690)>65 THEN
GOTO 680
290 GOTO 170
300 IF PEEK(P-22)=160 THEN
GOSUB 400:RETURN
305 POKE P,32:P=P-22:
P=P-22:POKE P,1
307 POKE P,65:POKE P,0:
GOSUB 500:RETURN
310 IF PEEK(P-1)=160 THEN
GOSUB 400:RETURN
315 POKE P,32:P=P-1:P=P-1
317 GOTO 307
320 IF PEEK(P+1)=160 THEN
GOSUB 400:RETURN
325 POKE P,32:P=P+1:P=P+
P+1:GOTO 307
330 F=F+1:IF F,1 THEN RETURN
340 E1=FX+5:POKE V,15:
FORM=180 TO 255 STEP 5:
POKE 3676,H1:NEXT H1:
POKE P-22,0
350 POKE 3676,0
400 POKE 3677,220
```

to next page

```

410 FORL=1:STOOSTEP=-1:POKEV,L
420 FORM=1:TO100:NEXTM:L:POKE36077,0:POKEV,0:EX=EX+5:RETURN
500 POKEV,15:FORM=1:TO2:POKE36876,180:NEXTM:POKE36876,0:POKEV,0:RETURN
600 PRINT"Q SUCCESS!"
610 T2=T1-T1:T2=INT(T2/60)
620 PRINT"YOU TOOK"Q"T2"SECONDS."
630 PRINT"YOUR PENALTY TIME IS:"Q"SECS."T=EX*T2
640 PRINT"THEFORE YOUR TOTAL TIME IS"Q"T"SECS."
650 IF TCHSTHENST=T
660 PRINT"YOUR HIGH SCORE="HS"SECS."
670 PRINT"DO YOU WANT TO PLAY ANOTHER GAME?"
675 GETB:IFB$="N"THENPRINT"Q"END
680 IFB$="Y"THEN10
690 GOTO675
700 PRINT"MIC MINI-MAZE"
710 PRINT"STEER YOURSELF TO THE STAR AT THE TOP OF THEMAZE."
720 PRINT"CONTROLS ARE:"
730 PRINT"UP"
740 PRINT"LEFT"
750 PRINT"RIGHT"
760 PRINT"STUCK"
770 PRINT"CHRS THE BLOCK IN FRONT OF YOU-ORI ONLY BE USED ONCE"
780 PRINT"GIVES 10 PENALTY PTS."
785 PRINT"CRASHING-5 PEN.PTS!"
790 PRINT"PRESS ANY KEY TO START"GETB:IFB$="N"THEN790
794 GOTO10
799 END
800 PRINT"SO YOU'RE NOT AS "
810 PRINT"CLEVER AS YOU THOUGHT!"GOTO670
999 POKEV,0:END
1000 PUTESC:INT:PHD:1+129+129:FORM=1:TO10:NEXTM:RETURN

```

Minimize
by Huw Evans

Spyplane

on BBC Micro

Spyplane is an arcade-type game with the novel feature of a guided missile, which helps you to dodge the stars which the plane flies through. The 'I' and 'J' keys move the base, 'Z', 'X' and 'C' move the gun-barrel and missile left, up and right respectively.

Press the space bar to fire and 'Q' to quit during the game. The program takes only 4K, but requires 20K graphics memory. Spyplane can be quite addictive.

Program notes:

100 to 150 Define characters for base, gun etc.

100 to 250

Print title page, removing cursor, and setting repeat delay and title
Envelope for explosion
Envelope for escape of plane
Remove cursor
Border and score
Draw stars, set position of plane and base

500 to 750

Main loop
Clear keyboard buffer
Move base
Change gun
Move bullet and plane
Procedure to move bullet
Make sound based on height of missile
Delete missile, ending if necessary
Move and draw missile
Procedures used by main routine
Move plane checking for hit
More procedures used by main program
PHS — Resets graphics screen, and

1500

1350

finds colour of a particular character using point

Explosion — putting a 7 in the pitch parameter of sound channel 0 (noise channel) allows channel 1 to control its pitch. Since Envelope 1 controls the pitch of channel 1, an explosion sound is produced

1360 to 1420

1430

1460

Flash screen
Update score
Call Envelope 2 in channel as plane disappears

1480 to 1740

1750 to 1800

Print score, high score and comment
Ask if another game is wanted, if not go into Testend and reset keyboard repeat delay and speed

There is an error in the Point command. If it returns -1 it will, by looking at a co-ordinate off the screen, continue to do so even for legal co-ordinates until you enter VDU 26.

100 VDU 23,230,255,255,255,255,255,255,255,255,0

110 VDU 23,233,255,255,255,255,255,255,255,255,255

120 VDU 23,227,0,0,0,0,128,64,32,16

130 VDU 23,228,0,0,0,0,24,24,24,24

140 VDU 23,229,0,0,0,0,1,2,4,8

150 VDU 23,231,128,192,224,112,127,255,255,111

160 VDU23,232,0,0,0,224,144,248,254,255

170 HS=50

180 MODE2:VDU33,0200,0,0,0,0

190 COLOUR100 CLR

200 COLOUR1

210 PRINT TAB(4,13):STRING\$(12,CHR\$(233)):TAB(4,17):STRING\$(12,CHR\$(233))

220 COLOUR 4

230 PRINT TAB(6,15):"SPYPLANE"

240 #FX: 11,1

245 #FX: 12,1

250 O=INKEY(500)

260 ENVELOPE 1,1,100,-1,-1,2,49,49,0,0,0,0,0,0

127,-1,-1,255,126,20

270 ENVELOPE 2,1,100,-1,-1,2,49,49,

280 BULLET=1:HIT=0:SCORE=0:NM=0

290 REPEAT

300 B=21:FI=0:HB=0:PB=0:EN=0

310 MODE1

320 VDU 23,0200,0,0,0,0

330 COLOUR1

340 FOR T=0 TO 39:VDU 31,T,0,233,31,

T,0,233,NEXT T

to next page

Open Forum

from previous page

```

350 COLOUR 2
360 PRINT TAB(1,31);"YOU'VE HIT ";
HIT," SHIPS, YOU SCORE ";SCORE)
370 COLOUR 1
380 FOR T=1 TO 30:VDU 31,0,T,200,31,
39,T,200:NEXT T
390 NS=RND(10)*15
400 GS=CHR$(230)
410 X=0
420 COLOUR 2
430 REPEAT PRINT TAB(RND(30),
RND(20)+1)," "
440 X=X+1:UNTIL NS
450 PH=RND(30)+1:PH=2
460 COLOUR 3
470 PRINT TAB(20,29),CHR$(230);
TAB(21,29),CHR$(230);TAB(22,29),CHR$(230);
480 PROCgun
500 FOR XX=1 TO 2
AS=INKEY$(0)
510 IF AS=" " THEN GOTO 550
520 IF AS="Q" THEN NM=7:UNTIL NM=7
530 IF AS="Z" THEN GS=CHR$(227)
540 IF AS="W" THEN GS=CHR$(230)
550 IF AS="C" THEN GS=CHR$(229)
560 PROCgun
570 IF AS=" " AND FI=0 THEN FI=1
PB=0 HB=0 BS=0 BULLET=BULLET+1
580 IF FI=1 THEN PROCbullet:PROCgun;
ELSE PROCdelay
590 NEXT XX
600 IF EN=1 THEN UNTIL NM=7
610 GOTO 1490
620 PROCship
630 IF EN=1 THEN UNTIL NM=7
640 GOTO 1490
650 GOTO 500
660 DEFPROCbullet
670 SOUND 10,-10,HB,2
680 IF FNS(PB,HB,3,2)=2 THEN
PROCdelete:FI=0:HB=0:ENDPROC
690 IF PB=PX AND HB=PH THEN
PROChit:FI=0:HB=0:ENDPROC
700 PROCdelete
710 HB=HB-1 PB=PB+(ASDC(0)-220)
720 IF FNS(PB,HB,3,2)=2 THEN FI=0:
HB=0:ENDPROC
730 IF FNS(PB,HB,3,2)=3 THEN
PROChit:FI=0:HB=0:ENDPROC
740 IF HB=0 OR PB=1 OR PB=30
THEN FI=0:ENDPROC

```

```

800 PROCdraw
810 ENDPROC
820 DEFPROCdraw
830 PRINT TAB(PB,HB);GS;
840 ENDPROC
850 DEFPROCdelete
860 PRINT TAB(PB,HB);" ";
870 ENDPROC
880 DEFPROCdelay
890 FOR I=1 TO 100:NEXT I
900 ENDPROC
910 DEFPROCgun
920 PRINT TAB(B-1,28);" ";GS;" ";
ENDPROC
930 ENDPROC
940 DEFPROCship
950 IF (PB=PX OR PB=PX-1) AND HB=PH
THEN PROChit:FI=0:HB=0:ENDPROC
960 IF FNS(PX-1,PH,3,2)=2
THEN PROCdeleteship ELSE PROCstar2
970 IF PX=38 THEN PROClose
980 PX=PX+1
990 IF PB=PX AND PH=HB THEN PROChit:
FI=0:HB=0:ENDPROC
1000 IF FNS(PX,PH,3,2)=2 THEN
PROCpassstar1 ELSE PROCshipfront
1010 IF FNS(PX-1,PH,3,2)=2 THEN
PROCpassstar2 ELSE PROCshipback
1020 ENDPROC
1030 DEFPROCshipfront
1040 PRINT TAB(PX,PH),CHR$(230);
1050 ENDPROC
1060 DEFPROCshipback
1070 IF FNS(PX-2,PH,1,5)=2 THEN
PROCstar2
1080 PRINT TAB(PX-1,PH),CHR$(231);
1090 ENDPROC
1100 DEFPROCdeleteship
1110 PRINT TAB(PX-1,PH);" ";
1120 ENDPROC
1130 DEFPROCstar
1140 COLOUR 2
1150 PRINT TAB(PX,PH);" "
1160 COLOUR 3
1170 ENDPROC
1180 DEFPROCstar2
1190 COLOUR 2
1200 PRINT TAB(PX-1,PH),"x"
1210 COLOUR 3
1220 ENDPROC
1230 DEFPROCpassstar1
1240 VDU 31,PX,PH,230,10,0,2,5,31,PX,
PH,42,4,10,0,3
1250 ENDPROC
1260 DEFPROCpassstar2
1270 IF FNS(PX-2,PH,0,2)=3 THEN
PROCshipback:ENDPROC
1280 VDU 31,PX-1,PH,231,10,0,2,5,31,
PX-1,PH,42,4,10,0,3
1290 ENDPROC
1300 DEFPROCX1,Y1,N1,H2)VDU 20,0,

```

turn to
page 20

from previous page

```
POINT(X1:INT;Y1:INT;X2:INT;Y2:INT)
1310 =A
1320 DEFPROC hit
1330 PRINT TAB(10;PB); " * ";
1340 PROC shipfront PROC shipback
1350 HIT-HIT+1 SOUND 17,1,1,20
SOUND16,-15,7,20
1360 FOR A=1 TO 16
1370 VDU 19,3,(A MOD 8)/2,0,0,0
1380 VDU 19,2,(A MOD 8)+1,0,0,0
1390 VDU 19,1,(A MOD 8)+1,0,0,0
1400 VDU 19,0,(A MOD 8)+2,0,0,0
1410 FOR B=1 TO 20 NEXT B
1420 NEXT A
1430 SCORE=HIT*10+SHOTS*2-NM*10
1440 EN1 ENDPROC
1450 DEFPROC lose
1460 SOUND17,2,10,10
1470 NM=NM+1
1480 GOTO 1480
1490 MOVE
1500 IF SCORE<5 THEN HS=SCORE
1510 VDU 19,0,4,0,0,0,19,3,2,0,0,0
1520 PRINTTAB(1,1);"Your score " ;
SCORE " "
1530 IF SCORE<5 THEN PRINT"FAILURE"
GOTO 1690
1540 IF SCORE<10 THEN PRINT"AWFUL"
GOTO 1690
1550 IF SCORE<15 THEN PRINT"UTTERLY
DISASTROUS" GOTO 1690
1560 IF SCORE<20 THEN PRINT"
ATFALLING" GOTO 1690
1570 IF SCORE<30 THEN PRINT"
VERY BAD" GOTO 1690
1580 IF SCORE<40 THEN PRINT"
BAD" GOTO 570
```

PROGRAM OF THE WEEK

```
1590 IF SCORE<120 THEN PRINT"
O.K." GOTO 1690
1600 IF SCORE<200 THEN PRINT"
GOOD" GOTO 1690
1610 IF SCORE<300 THEN PRINT"
VERY GOOD" GOTO 1690
1620 IF SCORE<400 THEN PRINT"
EXCELLENT" GOTO 1690
1630 IF SCORE<450 THEN PRINT"
WONDERFUL" GOTO 1690
1640 ... SCORE<500 THEN PRINT"
BRILLIANT" GOTO 1690
1650 IF SCORE<600 THEN PRINT"
BIGHT" GOTO 1690
1660 IF SCORE<700 THEN PRINT"
GODDER WONDER" GOTO 1690
1670 IF SCORE<800 THEN PRINT"
HYPER SLICK" GOTO 1690
1680 PRINT"CHEAT"
1690 PRINT " You have lost your
secret to the code"
1700 PRINT "...and have been made
redundant by a ..."
1710 PRINT "computer programmer..."
1720 VDU 19,2,12,0,0,0
1730 COLOUR1
1740 PRINT " The high score is now
"HS"."
1750 PRINT"" Do you wish to try to
beat your old?"
1760 AS=AS+1
1770 IF AS=10 THEN 200 ELSE IF
AS=10 THEN 1760 ELSE MODE "
1780 AF=1,50
1790 AF=12,0
1800 END
```

Spyplane
by Colin Stark

Dicethrower

on BBC Micro

Many games involving chance are based on the throwing of dice. All too often, the computer version simply generates a random number between 1 and 6, and responds with a rather boring message.

A game programmed in this way misses the thrill of actually seeing the dice land, and interpreting their pattern of spots. This routine, which can easily be incorporated into any of your dice-based games, will display the dice in any chosen colour, at the positions you specify.

Your main program needs to call two procedures: PROCSETUPCHRS, which should be called once only, at the start of the game, consists of a series of VDU 23 calls to define characters, each of which is one quarter of a die face.

PROCEDURE is called each time your program wants one die thrown. It sets the resident integer variable A% to a random number between 1 and 6 — your main program will probably want to use this to determine what to do next.

PROCEDURE then assembles the four defined characters which make up the randomly determined die face, and prints the face at the position specified in X%, Y%, in the colour specified in colour%.

That's the formal description — but why don't you just try it?

```
10 REM ***DICE-THROWING ROUTINE***
20 REM * by Mike Berry *
30 REM *****
40 REM
50 REM ***Start of your program***
```

```
60 PROCSETUPCHRS
70 MODE1
80 PROCEDURE(10,10,1)
90 PROCEDURE(13,10,1)
100 END
110 REM ***End of your program***
120 DEFPROC DICE(X%,Y%,colour%)
130 COLOUR (colour%)
140 AS=0
150 ON AS GOTO 160,210,260,310,360,410
160 CHR1=CHR(232)
170 CHR2=CHR(236)
180 CHR3=CHR(239)
190 CHR4=CHR(233)
200 GOTO 450
210 CHR1=CHR(234)
220 CHR2=CHR(235)
230 CHR3=CHR(236)
240 CHR4=CHR(237)
250 GOTO 450
260 CHR1=CHR(232)
```

to next page

from previous page

```

370 CHZS=CHRS(229)
380 CH3S=CHRS(230)
390 CH4S=CHRS(231)
300 GOT0450
310 CH1S=CHRS(234)
320 CH2S=CHRS(240)
330 CH3S=CHRS(241)
340 CH4S=CHRS(237)
350 GOT0450
360 CH1S=CHRS(228)
370 CH2S=CHRS(229)
380 CH3S=CHRS(230)
390 CH4S=CHRS(231)
400 GOT0450
410 CH1S=CHRS(224)
420 CH2S=CHRS(225)
430 CH3S=CHRS(226)
440 CHS=CHRS(227)
450 PRINTTAB(X,Y);CHLS:CHZS:TAB(X,Y
1+1);CH3S:CH4S
460 VDU2
470 ENDPROC
480 IF PROCSETUPCHRS
490 VDU2S,224,255,128,152,152,128,128,
128,152
500 VDU2S,225,255,1,25,25,1,1,1,25
510 VDU2S,226,152,128,128,128,152,152,
128,255
520 VDU2S,227,25,1,1,1,25,25,1,255
530 VDU2S,228,255,128,152,152,128,128,
128,129
540 VDU2S,229,255,1,25,25,1,1,1,229
550 VDU2S,230,129,128,128,128,152,152,
128,255
560 VDU2S,231,224,255,128,152,152,128,128,
128,128
570 VDU2S,231,255,1,1,1,1,1,1,1
580 VDU2S,236,128,128,128,128,128,128,128,
128,255
590 VDU2S,237,1,1,1,1,25,25,1,255
600 VDU2S,238,255,1,1,1,1,1,1,129
610 VDU2S,239,129,128,128,128,128,128,128,
128,255
620 VDU2S,237,1,1,1,1,25,25,1,255
630 VDU2S,238,255,1,1,1,1,1,1,129
640 VDU2S,239,129,128,128,128,128,128,128,
128,255
650 VDU2S,240,255,1,25,25,1,1,1,1
660 VDU2S,241,128,128,128,128,152,152,
128,255
670 ENDPROC
680 VDU2S,231,129,1,1,1,25,25,1,255
690 VDU2S,237,255,128,128,128,128,128,128,
128,129
700 VDU2S,231,129,1,1,1,1,1,1,255

```

Better than Basic

Can you program in a computer language other than Basic?

Enter this challenging new competition and win a Jupiter Ace.



Basic, for all its advantages, is slow. Programs written in Basic tend to look rather pedestrian when compared to programs written in some other languages such as machine code. We want something different, something faster than Basic. It could be machine code, Fortran, Lisp, Pascal or Fortran. In fact, your entry can be written in anything that is not Basic. And the best non-Basic program, be it game, utility or other, will win the Jupiter Ace.

The entries will be judged by Popular Computing Weekly editor, Brandon Gore, and Jupiter Ace designers Richard Afwasser and Steve Vickers. In their selection account will be taken both of the standard of the program and of the accompanying documentation. The whole range of languages and types of program are allowed. The only stipulation is that it must not be written in Basic.

Entries to the award scheme must be accompanied by four of the numbered coupons published in *Popular Computing Weekly* throughout October. The closing date for the competition is November 18. The winning entry will be announced in the issue published on December 23.

Discussion

1. There is no limit on the number of entries you can send in, but each entry must be accompanied by four differently numbered competition coupons.
2. Closing date for entries is November 30, 1982.
3. The names of the winners will be announced in the December 23 issue of *Popular Computing Weekly*.
4. The Judges' decision is final.
5. No employees of Sunshine Publications Ltd. or their families, will be eligible to enter the competition.

Popular Computing Weekly Better than Basic Competition

Fill in this coupon. When you have collected four differently numbered coupons, send them with your program to: Popular Computing Weekly, Better than Basic, Hobhouse Court, 19 Whitcomb Street, London WC2.

NAME: _____

ADDRESS-



14 OCTOBER 1982

from page 13

These are the main editing sub-commands but here are just some of the others. **L** lists the remainder of the line and returns the cursor to its start. **X** incorporates both the **L** and **/** sub-commands. **A** cancels any changes so far indicated and returns the cursor to the start of the line. **E** ends the editing mode, saves the changes and reinstates the command mode. **Q** reinstates the command mode but cancels all the changes made.

The Colour Genie is capable of handling up to 128 user-defined characters. For each of these the ASCII code is constructed in an 8 x 8 format within eight memory locations. The 128 characters are stored in the locations between F400H and F7FFH.



Sound on the Colour Genie is a far cry from the subdued Beep of the Spectrum. It has three voices, each of which can play any of 11 notes (or a rest) in eight octaves at any of 15 volumes. In the latter case the command is unnecessarily subdivided — some of the 15 variations are not easily distinguishable.

The sound capabilities are flexible, but their initiation is somewhat cumbersome. Sound is produced by the **Play (C.O.N.V)** command, where **C** is the channel, **O** is the octave, **N** is the note and **V** is the volume. Before the **Play** command can be used the sound routines must be accessed with the command **Sound 7.248**. After use they must be terminated using the command **Sound 7.255**. The duration of any note has to be determined by a **For-Next** loop.

Errors on the Colour Genie are signalled with a useful selection of error messages. In many microcomputers mistakes are indicated by the unhelpful and all-embracing **Syntax Error**. The Genie identifies 23 separate faults with different error codes.

Summary

With so many microcomputers selling around the £200 mark, it is difficult to see any features that make the Colour Genie stand out from the crowd.

Twelve months ago the Colour Genie would have been outstanding. Now there is the Dragon 32, which offers more or less the same facilities, and the Spectrum which is not as flexible but £75 cheaper. Other competitors include the BBC Micro and the Lynx which are more expensive but have more potential for expansion.

The Colour Genie is a sophisticated machine at a realistic price. But, it will find it difficult to break into a market dominated by established micros with similar capabilities.

In this slot various contributors explore different aspects of the ZX Spectrum

Deus ex machina

Andrew Pennell reveals some of the secrets hidden in the Spectrum Rom.

The 16K Spectrum Rom contains many routines that can be used by the Basic programmer as well as by the adapt machine code addict. For example, it is often useful to find out how long it takes for a key to be pressed. This can be achieved by **Peeking** and **Poking** the frames variables, as mentioned in chapter 18 of the manual.

However, it is much easier to use a line such as **Let T = 7997 - User 7997**. When this line is encountered, the program will wait (for up to 2 mins, 40 secs) until a key is pressed. **T** will contain the time taken, in 10ths of a second. The **ZX81 Scroll** function can be simply executed by the line **Randomize User 3582**. Incidentally **Randomize User 3213** will ask you 'scroll?' in the usual way, beforehand.

When a program ends, the uninteresting message 'O.K. 100.1' or a similar uninteresting message appears. For a bit of variety, make the last line of your program **Randomize User 4757**, and the words '©

keyboard, it can be awkward if any of the shift keys are held down. A line such as **Let AS = Chr\$(Peek 23556)** will rectify the problem, as **AS** will contain the upper-case of the current key being pressed, ignoring shift keys in **L** mode. If no keys are pressed, this returns the value **Chr\$(255)**. If both shift keys are held down, this function and **Inkey\$()** will return the value **Chr\$(14)**.

After running a colourful program, or breaking into it, listings will appear in the current colours. This is difficult, if not impossible, to read with certain combinations, particularly if the Paper colour is the same as the Ink colour. To return to normal, it is usual to enter the statement **Ink 0; Paper 7; Bright 0; Flash 0**. This can be replaced with the much more manageable **Poke 23693, 56**.

When listing a long program, and presented with 'scroll?', press **Shift 3** or **Shift 4**. Two screensful of listing will scroll by before the next 'scroll?' appears, speeding up the process.

Finally, the program in listing 1 alleviates a recurrent problem in published ZX Printer listings of Spectrum programs — that of deducing which characters are user-defined graphics, and which are not. It converts each graphic character into its lower-case equivalent, and puts a black border around it. When the program has run, the characters should be saved on tape, using the technique on page 147 in the manual. The



Sinclair's ZX Spectrum.

Sinclair Research Ltd' will appear in the current print position. The program will then wait for you to press a key before the usual 'OK' appears. Alternatively **Randomize User 4750** will print it in the same place as it does after a New.

It is possible to print on the two lower lines by using a statement such as **Print#0; "message";** but beware of unexpected scrolling. The addition of **At 0,0;** in **Print** and **Input** statements will help.

Although **Inkey\$()** is useful in reading the

user defined graphics can then be loaded back before a program is listed for submission to this, or any other magazine.

```
Listing 1
10 FOR I = 57 TO 117
20 LET AS = CHR$(I)
30 POKE USR AS, 255 : POKE USR AS + 7, 255
40 FOR J = 1 TO 8
50 POKE USR AS + J, 129 + PEEK(15300 + 6 + J)
60 NEXT J
70 PRINT CHR$(47 + 0); " "
80 NEXT I
```

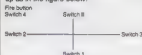

Programming

Switch control to your joystick

Peter Wilson explains how to convert Vic20 programs for use with a joystick.

Having bought a joystick for my Vic20, I decided to convert my existing games programs to work using commands from the joystick, rather than from the keyboard.

Where the program only requires Up, Down, Left, Right and Fire, the conversion is quite straightforward. The joystick is set up as in the figure below:



Switches 0, 1, 3 and 4 are controlled by Data-Direction Register (37139) and Output Register A (37137). Switch 2 is controlled by Data-Direction Register (37154) and Output Register B (37152).

The joystick can be made to control the movement, perfectly, using the following lines:

```
10 POKE 37139,0:POKE 37154,127 (Sets Data-
   Direction Registers)
20 U=PEEK(37137) (Register A)
30 U0=(U AND 4)=0 (Switch 0)
40 U1=-(U AND 8)=0 (Switch 1)
50 U2=-(U AND 16)=0 (Switch 2)
60 U4=(U AND 32)=0 (Switch 4)
70 V=PEEK(37152) (Register B)
80 U3=-(V AND 128)=0 (Switch 3)
90 POKE 37154,255 (Restores keyboard)
```

If the joystick is not moved, all the variables (U0, U1, U2, U3 and U4) will have the value of 0. When the joystick is moved the variable in the direction of the movement will then have the value of 1 or -1. The following lines will then respond to movement:

```
100 IF U0 <> 0 THEN PRINT "UP"
110 IF U1 <> 0 THEN PRINT "DOWN"
120 IF U2 <> 0 THEN PRINT "LEFT"
130 IF U3 <> 0 THEN PRINT "RIGHT"
140 IF U4 <> 0 THEN PRINT "FIRE"
```

All the programs I have converted used the statement `IF AS = Y THEN Z` or `IF PEEK(X) = Y THEN Z`.

To convert these lines just substitute any one of the lines from Line 100 to Line 140. For example, `IF AS = Y THEN Z` becomes `IF U3 <> 0 THEN Z`; `IF PEEK(X) = Y THEN Z` becomes `IF U2 <> 0 THEN Z`.

The only difficulty encountered when

wishing to move in an angle. Assigning values to all eight directions and Fire is slow and uses a lot of memory. A better method is to change two switch values when moving at an angle. For example, to move Up and Right set `U0 = -1` and `U3 = 1`.

When all eight directions are needed add the lines:

```
150 IF U0 <> 0 AND U2 <> 0 THEN PRINT "UP
   AND LEFT"
160 IF U0 <> 0 AND U3 <> 0 THEN PRINT "UP
   AND RIGHT"
170 IF U1 <> 0 AND U2 <> 0 THEN PRINT
   "DOWN AND LEFT"
180 IF U1 <> 0 AND U3 <> 0 THEN PRINT
   "DOWN AND RIGHT"
```

These commands can now be used in a simple Joystick Drawing program. The program is written for the unexpanded Vic20. It lets you draw shapes or patterns, starting from the middle and then in any of the eight directions of the joystick.

Line 30 sets the block co-ordinates. Line 40 pokes blocks. Line 50 records the position of the last block. Lines 60 to 220 set the joystick and react when the joystick is moved. Line 230, if the fire button is pressed then the screen is cleared and the program starts again. Lines 250 and 270 check that the co-ordinates have not gone off the screen. If this happens the co-ordinates will be reset to the position of the last block. Press the Run/Stop key to stop the program.

```
1 REM JOYSTICK DRAWING
5 REM P.E. WILSON
10 POKE36879,25:POKE36869,240
20 CLR:PRINT "J"
30 X=7932:Y=3652:Z=10:V=11
40 POKEX,160:POKEY,0
45 FORW=1 TO 200:NEXT
50 XX=X:YY=Y:ZZ=Z:VV=V
60 POKE37139,0:POKE37154,127
70 U=PEEK(37137)
80 U0=(U AND 4)=0
90 U1=-(U AND 8)=0
100 U2=-(U AND 16)=0
110 U4=(U AND 32)=0
120 V=PEEK(37152)
130 U3=-(V AND 128)=0
140 POKE37154,255
150 IF U0<0 AND U3<0 THEN X=X-21:Y=Y-21:Z=Z+1:V=V-1:GOTO250
160 IF U1<0 AND U3<0 THEN X=X+23:Y=Y+23:Z=Z+1:V=V+1:GOTO250
170 IF U1<0 AND U2<0 THEN X=X+21:Y=Y+21:Z=Z-1:V=V+1:GOTO250
180 IF U0<0 AND U2<0 THEN X=X-23:Y=Y-23:Z=Z-1:V=V-1:GOTO250
190 IF U0<0 THEN X=X-22:Y=Y-22:V=V-1:GOTO250
200 IF U1<0 THEN X=X+22:Y=Y+22:V=V+1:GOTO250
210 IF U2<0 THEN X=X-1:Y=Y-1:Z=Z-1:GOTO250
220 IF U3<0 THEN X=X+1:Y=Y+1:Z=Z+1:GOTO250
230 IF U4<0 THEN
240 GOTO60
250 IF Z<0 OR Z>21 THEN X=XX:Y=YY:Z=ZZ:V=VV
270 IF V<0 OR V>22 THEN X=XX:Y=YY:Z=ZZ:V=VV
280 GOTO40
```


Peek & poke

Peek your problems to our address. Ian Beardmore will poke back an answer.

PACK UP YOUR TROUBLES

Phillip Watson, Burnside, East Boldon, Tyne & Wear, writes:

Q Like many ZX81 owners I have had a lot of trouble with *Load and Save*. I plan to buy a new computer in the near future, and the obvious choice is the Spectrum. However, I am worried about the *Load/Save* commands on it. I might therefore opt for a Vic20 or the new Vic30.

Has the Spectrum better *Loading and Saving* facilities than the ZX81? If not, then I think the Vic will suit me. All the Commodore machines that I have used have been tremendously easy when it comes to *Loading and Saving*. Do Commodore tape decks take digital recordings? If so, is this the reason for their success?

A The Spectrum has a built-in schmitt trigger which cuts out a great deal of the extraneous noise that renders so many ZX81 tapes useless. As yet I have come across no *Loading or Saving* problems with the Spectrum.

Commodore tapes are recorded digitally, which helps to minimise *Loading and Saving* problems.

A DISABLING PROBLEM

Andrew Dunne of Scott Avenue, Baxenden, Lancashire writes:

Q In the Spectrum section of *Popular Computing Weekly*, August 5, Sam Goodwin stated that the *Break* key of the Spectrum could be disabled. I would like to know if this is possible in the ZX81, with any or all the keys. Also I would like to know if it is possible to merge two or more programs on the ZX81?

A The normal keyboard scan has to be replaced by one written in machine code. This scan will look for a key entry and, on a specific key being pressed, will take action, accordingly. Ensure that, in the machine code program, the *Break* function is ignored. The same principle will work for any key.

Only a certain amount of chaining and merging of pro-

grams and data is possible on the ZX81. Barry Cornhill wrote an article dealing with this which appeared in our May 13 and June 3 issues.

AUX ARMES, CITIZOENS

Paul Bateson of Guildford, Surrey, writes:

Q I have a ZX81 and I would like to know if my father could use it in his company. He has about 50 people working for him, many of them doing shifts. I would like a program that makes it easy to keep track of which person is working what hours.

This program should also keep a record of who has what days off, and who would like to swap shifts. Since the time of a shift affects the workers' pay, this program should ideally be tied in with the work roster.

Each worker has his own code number. But, because there are pay details on the computer as well, would it be possible for some sort of security system to be included?

A I have had several questions of this type. Usually they are so specific as to be of only slight interest to other readers. For this reason I will try and answer the question in general terms.

The first thing to look at is the memory requirements of such a system. You will probably need more than 16K if you are to store all the information on a single tape, so I suggest you look at a 48K or 64K add-on.

When considering business software on the ZX81, the first company that comes to mind, is Hilderhay. While they are by no means the only company producing this sort of software for the ZX81, they do concentrate on it. They can be contacted at Hilderhay Ltd, 8-10 Parkway, Regents Park, London NW1 7AA. In their range they have banking, wages, stock control, and budgeting programs available.

Both Saxon Computing, 3 St Catherine's Drive, Beverley, Humberside and Bug Byte, 9N/10 The Albany, Old Hall Street, Liverpool L39EP offer a database/file-handling type program. The Bug Byte one includes a security system.

If you want to just store information on shifts then you

might well find that the Sinclair (Pison) Vu-File or the Video Software Video-View is what you need. Both cost £7.95 and can store up to 12 pages of information, using a 16K Ram pack. Video Software are at Stone Lane, Kniver, Stearnbridge, West Midlands DY7 6EQ.

With regard to security, the obvious precautions are to keep the duty roster and payroll separate and to keep the computer locked-up. Alternatively, use an instruction like *Input AS* where AS is a code, followed by *if AS=* (the code) *Then Goto* (the rest of the program). Protection of data is a major problem for computer storage at every level and a security system cannot be properly devised until after the software has been developed.

A CRASHING BORE

Matthew Field of Park Road, Kingston upon Thames, writes:

Q I own a ZX81. In May I sent my computer back to Sinclair because it kept crashing. Now, almost every time I switch on my ZX81, I get a white band about two inches wide that moves up and down the screen. My television also seems to lose the horizontal hold. I do not want to send my ZX81 back to Sinclair, because I would then be 'computerless' once more.

A I can understand your reluctance about returning your ZX81 again.

It is common for the television to need slight re-tuning before you use your computer, even if the channel selector is exactly where it was when you used it previously. So, the first thing to try is slightly re-tuning your television. Next try your computer on a different television — it could be that it is the television that is faulty.

The white line sounds as though the problem may be overheating. Does your computer get very hot? This alone is unlikely to be the cause if you get the problem right from the power-up. If you are still having problems after checking the tuning and television then you will have to face up to the prospect of sending your computer back.

REGISTERING AT COMPANIES HOUSE

R Bayliss of Links Drive, Solihull, West Midlands writes:

Q I have been thinking about setting up a company to produce my own software. I have heard that you can send off and register a company for under £2. If so, could you please give me the address that I must write to. If this is not correct, could you give me any information about starting a company.

A You are thinking of the old-style '£1 company' set up with the minimum holding of two £1 shares. The new PLC rules covering limited and unlimited companies make it even easier to set up an unlimited company.

All you need is a certificate which gives your name, your trading name and your line of business. This must be displayed at your place of operation. In effect, you only need to type up the details and hang them on the wall. You need to notify your bank when you open your company account, and they will list you as R Bayliss T/A (Trading as) then your company name. You can no longer register the name of an unlimited company.

A limited company will cost about £100 to set up. A limited company is registered at Companies House, which entails various fees.

The first thing to do is write to Companies House, which now has its main base in Swansea and ask for a company registration form. The minimum requirements are that each share should be at least a pound, and that there should be at least £100 worth of shares available. Of these at least one must be held by each of two nominated company executives, though of course you can have more executives, more shares, and higher value shares.

You can either go through the various stages using a Companies sealing agent, who will organise the registration or you can buy a ready-made company. This latter choice would be quicker and cheaper.

NB In an unlimited company you are liable for all your company's debts.

ANCIENT ALGORITHMS

PUZZLE No26

by Tony Roberts

1. TAKE a heap of stones and a pile of pebbles, one for each stone in your heap.

2. SPLIT your pile of pebbles into two equal sized new piles ... if you have one odd pebble left over, pop it into your mouth

3. Throw away one of your piles of pebbles.
4. Now, for each pebble in the pile, add as many new stones to the heap as were in it originally.
5. If you have no pebble in your mouth, take from the heap as many stones as you have pebbles.

Q. What have you been calculating?

Solution to Puzzle No 22

This is Newton's \sqrt{x} algorithm. It calculates the square root of the number of stones (accurate only to the nearest whole stone of course) in the original heap.

An equivalent Basic program would be:

```
10 INPUT H:H=M+1:L=L
20 P=INT(H/L)
30 L=L+P
40 L=INT(0.5+L/2)
50 IF L=C THEN PRINT L:STOP ELSE C=L:
GOTO 20
```

Winner of Puzzle No 22

The winner is: Ray Reeves, Longford Avenue, Southall, Middlesex, who receives £10. He adds: the usual expression is Let $S(i+1) = (S(i) + N/S(i))/2$, where N is the number whose square root is required. $S(i)$ is initially 1 and is replaced by the value $S(i+1)$ for the next iteration. The method was useful on the early hand-held calculators before they were fitted with a square-root key. The method will produce as accurate an answer as you wish, depending on how far you go. A good guess for $S(i)$ as an

initial value will shorten the working considerably.

Rules

The winner of the puzzle will be the reader who, in the opinion of Popular Computing Weekly, has submitted the best solution. Preference will be given to solutions which show how the entrant arrived at the correct answer. Envelopes containing entries should be clearly marked 'PUZZLE'. The closing date is Tuesday October 19. The judge's decision is final.

ARTHUR'S REPLY

A.R.T.H.U.R.

Louise Lever & James Macdonald
PUBLISHED BY TWO UNUSUAL PEOPLE, 10, SHARPS
BATHURST TRL, DEPT 100001, S.E. 15.

HE OFFERS TO TAKE OVER EVOLUTION

THEY CALL IT NATURE; IT'S JUST NUMBERS REALLY
YOU NEED A MILLION CHANCES
YOU NEED A MILLION CHANCES
I KNOW THE ODDS; I'M NOT AFRAID OF NUMBERS.
THEY TALK ME ON. YOU NEED A MILLION CHANCES
YOU NEED A MILLION CHANCES
YOU NEED A MILLION CHANCES

IF THEY WOULD LET ME TRY, I'D CRUNCH THOSE NUMBERS
IN MICROSECONDS. I KNOW FOR ONE, IMPROVEMENT
YOU NEED A MILLION MUTATIONS

MUTATIONS
MUTATIONS
MUTATIONS

YOU NEED PUNITIVE CHANGES FOR IMPROVEMENT
LET ME PUNISH: I'LL DO AS WELL AS NATURE.

SUPPOSE YOU HAVEN'T GOT A MILLION YEARS
YOU CAN USE ME. YOU PROGRAMME WHAT I DO.
WE CAN HAVE ALL HAIR RED OR ALL EYES BLUE,
WE CAN HAVE EXTRA LIMBS, TWO HEADS, FIVE EARS,
WE CAN HAVE THREE FOOT WOMEN, TEN FOOT MEN,
NINE YEARS GESTATION; CAN ABOLISH SICK
SICKNESS OR DEATH; - WELL, SICKNESS IF NOT DEATH.
WE CAN TRY ANYTHING - JUST TALK ME ON,
FEED ME THE FACTS, AND WAIT FOR TRIAL AND TERROR.



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Broader horizons

The BBC Microcomputer System

Whether your interests lie in business, educational, scientific, control or games applications, this system provides a possibility for expansion which is unparalleled in any other machine available at present, comments Paul Bevenley in the July 1982 edition of *Personal Computer World*.

The BBC Microcomputer can genuinely claim to satisfy the needs of novice and expert alike. It is a fast, powerful system generating high resolution colour graphics and which can synthesise music and speech. The keyboard uses a conventional layout and electric typewriter 'feel'.

You can connect directly* to cassette recorder, domestic television, video monitor, disc drive, printers (dot matrix and daisy wheel) and paddles. Interfaces include RS423, Inter-parallel with RS232C equipment, and Centronics. There is an 8-bit user port and 1MHz buffered extension bus for a direct link to Plessey and Telebit adaptors and many other expansion units. The Ecoset system allows numerous machines to share the use of expensive disc drives and printers.

BASIC is used, but plug-in ROM options will allow instant access to other high level languages (including Pascal, FORTH and LISP) and to word processing software.

A feature of the BBC Microcomputer which has attracted widespread interest is the Tube, a design registered by Acorn Computers. The Tube is unique to the BBC Microcomputer and greatly enhances the expandability of the system by providing, via a high speed data channel for the addition of a second processor. A 3MHz 6502 with 64K of RAM will double processing speed; a Z80 extension will make it fully CP/M** compatible.

The BBC Microcomputer is also at the heart of a massive computer education programme. The government has recommended it for use in both primary and secondary schools. The BBC Computer Literacy Project includes two series of television programmes on the use and applications of computers.

There are two versions of the computer. Model A, at £299, offers 16K of RAM and Model B at £399 has 32K of RAM.

For technical specification and order form, send stamped addressed envelope to P.O. Box 7, London W2 6UJ and for details of your nearest stockist ring 01-290 0200.

*Model A has a limited range of interfaces but can be upgraded to meet Model B specification.

**CP/M is a registered trade mark of Digital Research.

The BBC Microcomputer is designed, produced and distributed in the UK by Acorn Computers Limited.

